

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

- 53
B17
1. A device for ablating an occlusion in a patient's blood vessel, comprising:
a drive shaft;
an ablation burr secured to the drive shaft, the ablation burr comprising a polymeric tube section, the polymeric tube section being expandable from an unexpanded state with a first diameter to an expanded state with a second larger diameter, the polymeric tube section having an abrasive coating disposed on at least a portion of its exterior surface to ablate an occlusion in a patient's vessel; and
an expansion control system to control the expansion of the burr to a predetermined expanded diameter when in the expanded state.
 2. The device of Claim 1, wherein the expansion control system is embedded within the polymeric tube section.
 3. The device of Claim 2, wherein the expansion control system comprises fibers arranged in a braided configuration.
 4. The device of Claim 2, wherein the expansion control system comprises a film layer.
 5. The device of Claim 4, wherein the film layer is an expanded Polytetrafluoroethylene.
 6. The device of Claim 1, wherein the polymeric tube section assumes the expanded state when rotated by the drive shaft.
 7. The device of Claim 1, wherein the expansion control system comprises internal curvilinear ribs disposed on the inside surface of the polymeric tube section.
 8. The device of Claim 7, wherein the curvilinear ribs straighten toward a linear configuration to control the expansion of the burr.
- 53
C07
- 36

an ablation burr secured to the drive shaft, the ablation burr comprising a polymeric balloon section, the polymeric balloon section having an unexpanded state

wherein the balloon section is expandable to create a seal with the vessel or stent when in the expanded state.

15. The reverse pull-back device according to Claim 14, wherein the polymeric balloon section has a proximal end portion and a distal end portion, and wherein the abrasive is disposed on the outer surface of the proximal end portion of the polymeric balloon section.

16. The reverse pull-back device according to Claim 15, wherein the ablation burr includes a smooth section on the distal end portion of the polymeric balloon section so that the ablation burr does not irritate the patient's vessel or stent when the ablation burr is rotating in the expanded state.

17. The reverse pull-back device according to Claim 14, wherein the device further comprises an aspiration catheter to remove the ablated lesion from the patient's vessel or stent.

18. The reverse pull-back device according to Claim 14 , wherein the balloon section unfurls to the expanded state as the drive shaft is rotated.

19. A method for ablating a lesion or occlusion in a patient's vessel or stent comprising:

routing an ablation burr in an unexpanded state over a guide wire to a position distal to the lesion;

rotating a drive shaft to begin the expansion of the ablation bur;

pulling the ablation burr in an expanded state proximally toward to the lesion;

ablating the lesion with the ablation burr as the ablation burr passes through the lesion.

20. The method according to Claim 19, further comprising the step of removing the ablated material from the patient's vessel or stent through an aspiration catheter.

22. The method according to Claim 19, wherein the ablation butt includes a balloon section, the balloon section creating a seal with the vessel or stent when in the expanded state.

routing the ablation burr in an unexpanded state over the guide wire to a position distal to the lesion;

pulling the ablation burr in an expanded state toward a position proximal to the lesion; and

24. The method according to Claim 23, further comprising the step of removing the ablated material from the patient's vessel or stent through the aspiration catheter.

25. The method according to Claim 23, further comprising the step of deploying a self-expanding seal from within the aspiration catheter after the ablation burr begins to expand.

26. The method according to Claim 23, wherein the ablation bur has a forward cutting surface when in the unexpanded state.

48
057

ADD
C67

to Claim 23, wherein the step of routing
n through the lesion so that the ablation b
the lesion.

vice for ablating a lesion in a patient's blo

e drive shaft, the ablation burr comprising
ric balloon section having an unexpanded st
ed state with a second larger diameter,
abrasive coating disposed on at least a port
in a patient's vessel or stent; and
around the drive shaft to remove the abla

device according to Claim 8, wherein
l end portion and a proximal end portion a
the polymeric balloon section, the wire m
of the balloon section and extending to ab
that the proximal end portion of the ballo
n.

device according to Claim 9, wherein
the expanded state.

k device according to Claim 28; furt
led to the aspiration catheter.

an ablation burr secured to the drive shaft, the ablation burr comprising a polymeric balloon section, the polymeric balloon section having an unexpanded state with a first diameter and an expanded state with a second larger diameter, the polymeric balloon section having an abrasive coating disposed on at least a portion of its exterior surface to ablate a lesion in a patient's vessel or stent; and

an aspiration catheter disposed around the drive shaft to remove the ablated material from the lesion.

29. The reverse pull-back device according to Claim 8, wherein the polymeric balloon section has a distal end portion and a proximal end portion and includes a wire mesh disposed within the polymeric balloon section, the wire mesh beginning at the proximal end portion of the balloon section and extending to about the midpoint of the ablation burr so that the proximal end portion of the balloon section forms a concave shaped portion.

30. The reverse pull-back device according to Claim 9, wherein the abrasive is coated on the wire mesh in the expanded state.

31. The reverse pull-back device according to Claim 28, further comprising a self-expanding seal coupled to the aspiration catheter.